Remarks/Arguments:

Applicants appreciate the Examiner's allowance of claim 5.

Claims 12-17 have been rejected under 35 USC §112, second paragraph, as being indefinite. These claims have been amended to no longer depend from withdrawn claims. Therefore, Applicants respectfully submit that claims 12-17 are not subject to rejection under 35 USC §112, second paragraph, as being indefinite.

Claims 1, 3, and 12-17 have been rejected under 35 USC §103(a) as being unpatentable over Kusuda et al. (US 5,814,841) in view of Uchida (US 5,751,753) and Ek et al. (US 5,461,243). It is respectfully submitted that the rejection of claims 1, 3, and 12-17, as amended, as being unpatentable over Kusuda et al. in view of Uchida and Ek et al. is traversed for the reasons set forth below.

Kusuda et al. disclose laser thyristor structures in Figures 31 and 32 and in the specification at column 22, lines 12-44. These structures include an n-type GaAs substrate (19) with an n-type AlGaAs layer (25), a p-type AlGaAs layer (24), an intrinsic GaAs layer (23), another n-type AlGaAs layer (22), and another p-type AlGaAs layer (21) stacked in order on top of it. The intrinsic GaAs layer (23) functions as the active layer of these laser structures. The specification also discloses that a buffer layer (not shown in the Figures) may be formed between the substrate (19) and the first n-type AlGaAs layer (25).

Uchida discloses a semiconductor laser structure in which a "...buffer layer including a composition graded layer [may be used for] gradually changing the lattice constant..." between the substrate and the clad layer of the structure (Abstract, lines 7-11).

Ek et al. disclose that the conventional practice to produce a relaxed SiGe buffer layer on a Si substrate is "...to grow a uniform, graded, or stepped SiGe layer to beyond a metastable critical thickness..." (Column 1, lines 39-41). This relaxed SiGe buffer layer is then used as a surface for growing strained Si layers as part of high mobility structures for FET applications (Column 1, lines 14-17).

The present invention, as recited in claim 1, contains a feature which is neither disclosed, nor suggested by the Kusuda et al., Uchida and Ek et al., singly or in combination, namely:

> ... four layers consisting of a first conductivity type of AlGaAs layer and a second conductivity type of AlGaAs layer stacked alternately on the buffer layer;
>
> wherein the AlGaAs layer just above the buffer layer is composed of a plurality of AlGaAs layers, Al compositions thereof being increased upward in steps. (Emphasis Added)

This feature, which is illustrated as layers 50-1, 50-2, 50-3, and 50-4 in Figure 6 of the present application, is neither disclosed nor suggested by Kusuda et al. Furthermore, this feature, which recites the use of stepped Al composition layers within one of AlGaAs layers of the thyristor npnp structure, is distinguished from the buffer layers in Uchida and Ek et al. Uchida specifically teaches to include a composition graded layer as part of the buffer layer and teaches away from including such a composition graded layer in an upper level semiconductor layer (for example, in the clad layer) due to the cross hatch step pattern formed in the composition graded layer (column 4, line 64, through column 5, line 9). Ek et al. disclose the use of a stepped composition SiGe buffer layer on which to grow strained Si layers, but do not suggest the use of such structures in active layers of III-V semiconductor devices.

Applicants also note that Kusuda et al. disclose a P-I-N diode structure in which the intrinsic GaAs layer serves as the active layer of the laser structure. The present invention as recited in claims 1 and 3 uses the stacked AlGaAs layers as active layers and does not include an intrinsic GaAs layer in the recited npnp thyristor structure.

The present invention, as recited in claim 3, contains a similar feature which is neither disclosed, nor suggested by the Kusuda et al., Uchida and Ek et al., singly or in combination, namely:

> ...four layers consisting of a first conductivity type of AlGaAs layer and a second conductivity type of AlGaAs layer stacked alternately on the buffer layer;
>
> wherein the Al composition of the AlGaAs layer just above the buffer layer is increased upward continuously. (Emphasis Added)

Applicants also note that Kusuda et al. disclose a P-I-N diode structure in which the intrinsic GaAs layer serves as the active layer of the laser structure. The present invention as recited in claims 1 and 3 uses the stacked AlGaAs layers as active layers and does not include an intrinsic GaAs layer in the recited npnp thyristor structure. Neither Uchida nor Ek et al.

disclose an npnp thyristor structure to overcome this deficiency of Kusuda et al. with respect to claim 1 and 3.

Therefore, for the reasons set forth above, claims 1 and 3 are not subject to rejection under 35 USC §103(a) as being unpatentable over Kusuda et al. in view of Uchida and Ek et al. As claims 12-17, as amended, depend from any one of independent claims 1, 3, or 5, these claims are not subject to rejection as well. Additionally, claims 2 and 4 have been objected to as being dependent on a rejected claim. Therefore, for the reasons set forth above, Applicants respectfully submit that claims 2 and 4 are no longer subject to objection as well.

CONCLUSION

Based on the foregoing amendment and remarks, Applicants respectfully submit that claims 1-5 and 12-17, as amended, are in condition for allowance. Accordingly, reconsideration and allowance of all pending claims are respectfully requested.

Respectfully submitted,

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Tonya M. Berger